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OBSERVATIONS OF L_α-EMISSION FROM MILKY WAY

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SUMMARY

This note gives account of the results of registration of ultraviolet radiation during the flight of AIS "VENERA-2" and "VENERA-3".

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The ultraviolet radiation was registered from the above interplanetary stations in two spectral bands: 1050 – 1340 A and 1225 – 1340 A [1, 2, 3].

In the first band the radiation was mainly determined by the scattering of solar L_α-quanta on neutral interplanetary hydrogen, whose intensity was averaging during the time of flight $6 \cdot 10^{-5}$ erg/cm^{2}sec ster. In the second spectral interval the main contribution to the counting rate was determined by cosmic rays (31 pulses/sec). The response of the second photon counter to L_α-radiation did not exceed 0.1% owing to a complementary filter made of calcium fluoride and having a thickness of about 1 mm. The device's visual field, sensitive to L_α-radiation was of 7°, while that of the channel with the complementary CaF_2 filter was $\sim$ 20°. Near Earth both probes spinned near the axis "AIS – Sun", so that the photometer's axis described a cone with aperture angle of 140°. At the same time the Earth's hit the device's visual field. In this case the reading reached 600 pulses/sec, which is the result of scattering of solar emission in L_α on hydrogen atoms dissipating from the upper atmosphere of the Earth [3].

The registration of device's readings aboard AIS VENUS-2 obtained on 12 November 1965 from a distance of 164,000 km from the center of the Earth is plotted in Fig.1 . Well seen on the registration are the maxima during the scanning of the Earth, and also two complementary maxima with intensity about 10 times lesser judging from the number of pulses. One of these maxima coincides with the direction toward the Earth. The registration from AIS VENUS-3 obtained on 18 November 1965 from a distance of 820,000 km shows the same peculiarities: two extended maxima and an intense peak linked with the passage of photomer's visual field through the Earth (Fig.2). The increase of the counting rate in the channel sensitive to the band 1225 – 1340 A during

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* "VENERA" STANDS FOR "VENUS" and will be so called in the text.

the scanning of the Earth is linked with the scattering of solar emission lines of atomic oxygen triplet λλ 1302, 1304 and 1306 A. During the observations from the AIS the Earth was projected on the region of the Milky Way near CMa ($\alpha = 7^h$, $\delta = -20°$), the position of the second maximum is found to be near Las ($\alpha = 22^h$, $\delta = +40°$) also near the Milky Way band. The photomer's visual field intersected the galactic equator at an angle of about 40°, so that the extension of the maxima in a direction perpendicular to the galactic plane constituted about 60°. Both maxima are somewhat shifted relative to the galactic equator by 10 to 20°. The intensity in the 1050 – 1340 A band was about $2.5 \cdot 10^{-5}$ erg/cm^2 sec ster according to data from VENUS-3 and $6 \cdot 10^{-5}$erg/cm^2. sec.ster according to those of VENUS-2 (respectively 20 and 50 rayleighs).

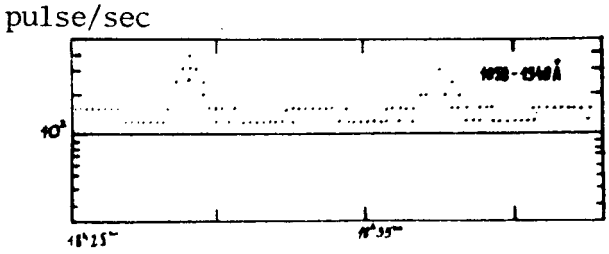

Fig.1. Readings of the device sensitive to L_α during communication with VENUS-2

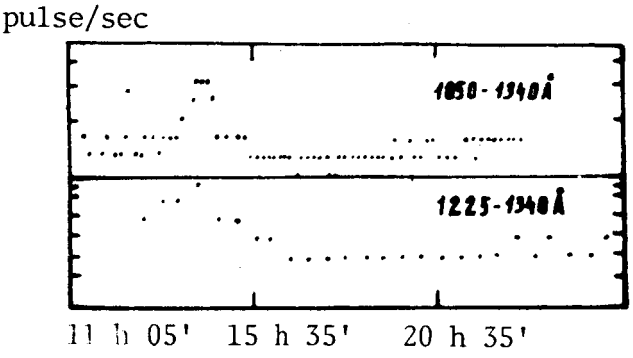

Fig.2. Readings of the device in two spectral bands during communication with VENUS-3

The reading in the 1225 –1340 A channel (outside the line L_α) was equal to $\sim 2 \cdot 10^{-7}$ erg/cm^{2}sec ster. (according to measurements from VENUS-3), i. e., near 100 times less than in the line L_α. The discrete character of the system of measurements does not allow us to attain a greater measurement precision, which is well understood from the above data (Figs. 1 and 2). It is obvious that the reading in the channel beyond L_α is linked with the aggregate emission of stars in the Milky Way. Assuming the brightness of stellar backgound in the visible part of the spectrum to be as an average $4 \cdot 10^{-8}$ erg/cm^2 sec ster./A [4], we find that the ratio of brightness in the Milky Way band near λ 1300 A to that near λ 5500 A is $\sim 10^{-2}$which is substantially

lower than the estimates usually admitted (by at least one order of magnitude). As to the emission in the line $\lambda\lambda$ 1050 – 1340, its explanation is met with significant difficulties linked, first of all, with the small length of the free path of the L_α-quantum ($\sim$ 0.3 ps) in interstellar medium, while the observed maximum with extension $\sim$ 60° requires a length of the free path $\sim$ 100 ps, commensurate with the thickness of galaxy's hydrogen disk. Essentially isotropic emission would have been observed at smaller lengths of the free path. This question will be dealt with in a separate paper [5].

**** THE END ****

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